(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property Organization
International Bureau

(43) International Publication Date
18 March 2004 (18.03.2004)

PCT

(10) International Publication Number
WO 2004/022876 A1

(51) International Patent Classification[7]: E04C 5/16

(21) International Application Number:
PCT/KR2003/001751

(22) International Filing Date: 29 August 2003 (29.08.2003)

(25) Filing Language: Korean

(26) Publication Language: English

(30) Priority Data:
20-2002-0026465
4 September 2002 (04.09.2002) KR

(71) Applicant *(for all designated States except US)*: **WIN WIN DEVELOPMENT CO.,LTD.** [KR/KR]; Rm3118, Ma-Dong, Chungang Circulation Complex 1258, Gurobon-Dong, Guro-Gu, Seoul 152-721 (KR).

(72) Inventor; and

(75) Inventor/Applicant *(for US only)*: **SONG, Jae-Hyeuk** [KR/KR]; Hyundai apartment 104dong 803ho, 219-4, Chongsoo-Dong, Chonahnsi, Chungchongnam-Do 330-190 (KR).

(74) Agent: **CHOI, Young-Bok**; Yuliahn International Patent & Law office, 2nd Fl. Seohan Building, 943-2 Dogok-Dong, Kangnam-Gu, Seoul 135-270 (KR).

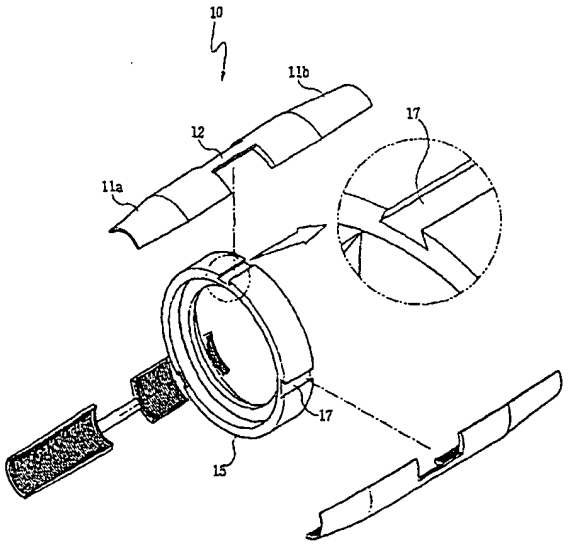
(81) Designated States *(national)*: AE, AG, AL, AM, AT, AU, AZ, BA, BB; BG, BR, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, YU, ZA, ZM, ZW.

(84) Designated States *(regional)*: ARIPO patent (GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IT, LU, MC, NL, PT, RO, SE, SI, SK, TR), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

Published:
— *with international search report*

For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

(54) Title: SHELL UNIT OF COMPRESSION-COUPLING DEVICE FOR IRON BARS



(57) Abstract: A shell unit of a compression-coupling device for iron bars. The shell unit (10) has at least two shell pieces each of which includes two shell parts having the same shape. The two shell parts are connected together into a single structure by a connection rib (12), with a plurality of projections formed on inner surfaces of the shell pieces to grip the iron bars. A support (15) is surrounded by the shell pieces at a position inside the connection ribs (12), thus supporting the shell pieces at predetermined positions in the compression-coupling device. A plurality of locking grooves (17) are formed around an outer surface of the support (15) at regular intervals to allow the connection ribs (12) to be locked to the support by being fitted into the locking grooves. Due to the shell unit, the compression-coupling device easily and stably couples the iron bars to each other.

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SHELL UNIT OF COMPRESSION-COUPLING DEVICE FOR IRON BARS

Technical Field

The present invention relates, in general, to compression-coupling devices for iron bars, which couple the iron bars to each other, and, more particularly, to a shell unit of such a compression-coupling device for the iron bars, which grips and fixes ends of the iron bars in the compression-coupling device and has an improved structure that allows a user to easily and quickly assemble the compression-coupling device during an iron bar-coupling process.

Background Art

An example of conventional compression-coupling devices for iron bars may be referred to Korean Utility Model Registration No. 286101 or 286202 allowed to the inventor of the present invention. In the two compression-coupling devices for iron bars disclosed in Korean Utility Model Registration Nos. 286101 and 286202, the general shape remains the same, but shell units installed in cylindrical bushes of the two compression-coupling devices to grip and fix the iron bars in the two compression-coupling devices have different structures. That is, as shown in FIG. 1 of the accompanying drawings, the two conventional compression-coupling devices for iron bars each comprise a compressible bush 1 which has an external thread on an outer surface thereof, two fastening nuts 2A and 2B, and a shell unit 3 comprising three shell pieces each of which includes two shell parts 4a and 4b (or 4c and 4d) having the same shape. In the shell unit 3, the two shell parts 4a and 4b (or 4c and 4d) of each shell piece have a plurality of projections on inner surfaces thereof to grip and fix the iron bars, and are connected together into a single structure by a connection rib 5. The shell unit 3 further comprises a cylindrical support 6 that is surrounded by the shell pieces at a position inside the connection ribs 5 to support the shell pieces at

predetermined positions in the compression-coupling device. The two fastening nuts 2A and 2B are respectively tightened over both ends of the external thread of the compressible bush 1, thus compressing the shell parts 4a and 4b (or 4c and 4d) of the shell pieces of the shell unit 3 which is placed in the compressible bush 1.

When it is required to couple two iron bars S to each other using the conventional compression-coupling device, the two fastening nuts 2A and 2B are somewhat loosened from both ends of the compressible bush 1, and ends of the two iron bars S are inserted into both ends of the compression-coupling device. In such a case, the ends of the two iron bars S are inserted into both ends of the shell unit 3 while passing through the shell parts 4a and 4b (or 4c and 4d) of the shell pieces of the shell unit 3. After fully inserting the ends of the two iron bars S into both ends of the shell unit 3, the two fastening nuts 2A and 2B are tightened over the ends of the compressible bush 1. In such a case, the two fastening nuts 2A and 2B gradually compress the shell parts 4a and 4b (or 4c and 4d) of the shell pieces of the shell unit 3 at both ends of the shell unit 3, respectively, thus allowing the shell parts 4a and 4b (or 4c and 4d) to firmly grip and fix the ends of the iron bars S in the compression-coupling device. Because the plurality of projections which are formed on the inner surfaces of the shell parts 4a and 4b (or 4c and 4d) of the shell unit 3 firmly engage with projections formed on the outer surfaces of the iron bars S, the iron bars S are not undesirably separated from the conventional compression-coupling device once the iron bars S are coupled to each other by the conventional compression-coupling device.

However, because the shell parts 4a and 4b (or 4c and 4d) of each of the three shell pieces of the conventional shell unit 3 are connected together into a single structure by the connection rib 5, with the cylindrical support 6 surrounded by the shell pieces at the position inside the connection ribs 5 to support the shell pieces at the predetermined positions in the compression-coupling device, as described above, a user must insert the shell unit 3 into the compressible bush 1 while arranging the connection ribs 5 of the shell pieces of the shell unit 3 around

the outer surface of the support 6 at the regular intervals. In such a case, the three shell pieces of the conventional shell unit 3, each having the shell parts 4a and 4b (or 4c and 4d), may undesirably move on the outer surface of the support 6, so that the shell pieces of the conventional shell unit 3 may be easily displaced from desired positions in the compression-coupling device or furthermore removed from the compression-coupling device during an iron bar-coupling process using the compression-coupling devices. Therefore, it is very difficult to assemble the compression-coupling devices having the conventional shell units, and to couple the iron bars to each other using the compression-coupling devices having the conventional shell units.

Disclosure of the Invention

Accordingly, the present invention has been made keeping in mind the above problems occurring in the prior art, and an object of the present invention is to provide a shell unit of a compression-coupling device for iron bars, which has an improved structure that allows a user to easily and quickly assemble the compression-coupling device during an iron bar-coupling process.

In order to accomplish the above object, the present invention provides a shell unit of a compression-coupling device for iron bars, which is installed in a compressible bush that is tightened with two fastening nuts at both ends of the bush to compress the shell unit, and comprises at least two shell pieces each of which comprises two shell parts having a same shape, the two shell parts being placed at both ends of each of the shell pieces and connected together into a single structure by a connection rib, with a plurality of projections formed on inner surfaces of the shell pieces to grip the iron bars; and a support surrounded by the shell pieces at a position inside the connection ribs, thus supporting the shell pieces at predetermined positions in the compression-coupling device, the shell unit further comprising: a means for locking the connection ribs of the shell pieces to the support, the locking means comprising a plurality of locking grooves

formed around an outer surface of the support at regular intervals to allow the connection ribs to be locked to the support by being fitted into the locking grooves.

Brief Description of the Drawings

The above and other objects, features and other advantages of the present invention will be more clearly understood from the following detailed description taken in conjunction with the accompanying drawings, in which:

FIG. 1 is an exploded perspective view of a compression-coupling device for iron bars that has a conventional shell unit;

FIG. 2 is an exploded perspective view of a shell unit of a compression-coupling device for iron bars, according to a first embodiment of the present invention;

FIG. 3 is a sectional view of a shell piece and a support of the shell unit, according to the first embodiment of the present invention;

FIGS. 4 and 5 are exploded perspective views of shell units of compression-coupling devices for iron bars, according to second and third embodiments of the present invention, respectively;

FIG. 6a is a longitudinal sectioned view of a support of the shell unit, according to the third embodiment of the present invention;

FIG. 6b is a latitudinal sectioned view of the support of the shell unit, according to the third embodiment of the present invention;

FIGS. 7 to 10 are sectional views of shell units of compression-coupling devices for iron bars, according to fourth to seventh embodiments of the present invention, respectively;

FIG. 11 is a sectional view of a shell unit of a compression-coupling device for iron bars, according to an eighth embodiment of the present invention; and

FIG. 12 is an exploded perspective view of a shell unit of a compression-

coupling device for iron bars, according to a ninth embodiment of the present invention.

Best Mode for Carrying Out the Invention

Reference should now be made to the drawings, in which the same reference numerals are used throughout the different drawings to designate the same or similar components.

FIG. 2 is an exploded perspective view of a shell unit of a compression-coupling device for iron bars, according to a first embodiment of the present invention. As shown in FIG. 2, the shell unit 10 which is installed in a compressible bush of the compression-coupling device that is tightened with two fastening nuts at both ends of the bush to compress the shell unit 10, comprises three shell pieces each of which comprises two shell parts 11a and 11b having the same shape. The two shell parts 11a and 11b are placed at both ends of each of the shell pieces and are connected together into a single structure by a connection rib 12, with a plurality of projections formed on inner surfaces of the shell pieces to grip the iron bars. A support 15, having a circular ring shape or a polygonal ring shape, is surrounded by the shell pieces at a position inside the connection ribs 12, thus supporting the shell pieces at predetermined positions in the compression-coupling device. The shell unit 10 further includes a means for locking the connection ribs 12 of the shell pieces to the support 15. In the first embodiment of the present invention, the locking means comprises a plurality of locking grooves 17 which are formed around an outer surface of the support 15 at regular intervals to allow the connection ribs 12 to be locked to the outer surface of the support 15 by being fitted into the locking grooves 17. Each of the locking grooves 17 has a cross-section of a dovetail mortise, so that once each of the connection ribs 12 having a cross-section of a dovetail tenon is forcibly fitted into each of the locking grooves 17, the connection ribs 12 are not undesirably removed from the locking grooves 17.

As best seen in FIG. 3, the support 15 may have a ring-shaped stop flange 16 which is formed around the inner surface of the support 15 to limit depths to which the iron bars S are respectively inserted into the support 15 from both ends of the support 15.

FIG. 4 is an exploded perspective view of a shell unit of a compression-coupling device for iron bars, according to a second embodiment of the present invention. As shown in FIG. 4, the support 35 of the shell unit according to the second embodiment of the present invention is produced by bending a strip-shaped metal or plastic sheet into a circular or polygonal shape while folding the strip-shaped metal or plastic sheet to form a plurality of locking grooves 37 around the outer surface of the support 35 at regular intervals.

FIG. 5 is an exploded perspective view of a shell unit of a compression-coupling device for iron bars, according to a third embodiment of the present invention. FIG. 6a is a longitudinal sectioned view of a support of the shell unit, according to the third embodiment. FIG. 6b is a latitudinal sectioned view of the support of the shell unit, according to the third embodiment. As shown in FIGS. 5, 6a and 6b, the support 45 of the shell unit according to the third embodiment of the present invention is produced by bending a strip-shaped sheet into a circular or polygonal shape. To form a plurality of locking grooves 47 around the support 45 at regular intervals, the support 45 is circumferentially cut at several positions to form a plurality of partial cut parts which are arranged along each of both edges of the support 45 and are each defined between two cut lines. The partial cut parts are, thereafter, pressed toward a center of the support 45, thus forming the locking grooves 47 having a specific shape. In the third embodiment of the present invention, each of the connection ribs 42 of the shell unit comprises two connection rib pieces that are respectively integrated with two separate shell parts 41a and 41b of the shell unit. The connection rib pieces of the shell parts 41a and 41b, each of which has a wedged hook part at an end thereof, are locked to the locking grooves 47 of the support 45 at the wedged hook parts thereof, respectively.

In another embodiment of the present invention, the connection rib pieces of the separate shell parts of the shell unit may be designed as connection pins having a circular cross-section, and each locking groove of the support of the shell unit may be designed as a hole having a circular shape to receive each of the connection pins.

In addition, to form a plurality of stop pieces 48 around the inner surface of the support 45 at regular intervals to limit depths to which the iron bars S are respectively inserted into the support 45 from both ends of the support 45, the support 45 is further circumferentially cut at several positions to form a plurality of partial cut central parts which are arranged along a central line of the support 45 and are each defined between two cut lines. Each of the partial cut central parts is, thereafter, cut at a center thereof into two pieces, and the two pieces of each of the partial cut central parts are bent toward the center of the support 45, thus forming the stop pieces 48. The formation of the stop pieces 48 may be adapted to the support 35 of the second embodiment, without affecting the functioning of the support 35. The locking grooves 47 and the stop pieces 48 may be simultaneously formed on the strip-shaped sheet through one pressing process, before the strip-shaped sheet is bent into the support 45. Therefore, the shell unit according to the third embodiment reduces the time consumption and the production costs while producing the shell units of the compression-coupling device for iron bars.

FIG. 7 is a sectional view of a shell unit of a compression-coupling device for iron bars, according to a fourth embodiment of the present invention. As shown in FIG. 7, the shell unit 50 according to the fourth embodiment of the present invention has a locking groove 54a, 54b on an inner surface of each of the shell parts 51a and 51b of each shell piece, with two supports 55a and 55b engaging with the locking grooves 54a and 54b of the shell pieces, respectively. To assemble the parts of the shell unit 50 with the compressible bush of the compression-coupling device into a single structure, the shell pieces having the locking grooves 54a and 54b at the shell parts 51a and 51b thereof are arranged

around the supports 55a and 55b such that the locking grooves 54a and 54b of the shell pieces engage with the supports 55a and 55b. Thereafter, the shell unit 10 is inserted into the compressible bush.

FIG. 8 is a sectional view of a shell unit of a compression-coupling device for iron bars, according to a fifth embodiment of the present invention. In the shell unit according to the fifth embodiment of the present invention, to form the locking means, the connection rib 62 between the shell parts 61a and 61b of each shell piece is shortened, such that the shell pieces are firmly arranged around the support 15 at regular intervals, with the connection ribs 62 firmly fitted over the outer surface of the support 15.

FIG. 9 is a sectional view of a shell unit of a compression-coupling device for iron bars, according to a sixth embodiment of the present invention. In the shell unit according to the sixth embodiment of the present invention, to form the locking means, the connection rib 72 between the shell parts 71a and 71b of each shell piece is bent at a central portion thereof upward to form a locking groove 74 of a dovetail mortise shape on an inner surface of the connection rib 72, so that the shell pieces are firmly arranged around the support 15 at regular intervals, with the dovetail mortises 74 of the connection ribs 72 firmly fitted over the outer surface of the support 15.

FIG. 10 is a sectional view of a shell unit of a compression-coupling device for iron bars, according to a seventh embodiment of the present invention. In the shell unit according to the seventh embodiment of the present invention, the connection ribs 12 of the shell pieces are integrated with the outer surface of the support 15 through a welding process or a bonding process, in place of using the above-mentioned locking means. When the shell pieces are integrated with the outer surface of the support through the welding process, the separate shell parts 81a and 81b of each shell piece may be directly welded to both edges of the support 95 without being connected together by the connection rib, as shown in FIG. 11 which shows a shell unit of a compression-coupling device for iron bars, according to an eighth embodiment of the present invention.

FIG. 12 is an exploded perspective view of a shell unit of a compression-coupling device for iron bars, according to a ninth embodiment of the present invention. In the shell unit according to the ninth embodiment of the present invention, a plurality of locking holes 97 are formed around the support 95 at regular intervals, while the connection rib 92 between the shell parts 91a and 91b of each shell piece is provided with a locking pin 93. To assemble the shell pieces with the support 95 into a single structure, the locking pins 93 of the shell pieces are inserted into the locking holes 97 of the support 95, respectively.

The above-mentioned structure of the support 95 according to the ninth embodiment of the present invention minimizes a deformation of the support 95, regardless of an external force, such as a pressure, applied to the support 95. That is, when the strip-shaped sheet is bent to form a support while folding or cutting parts of the sheet to form the locking grooves as described in the third and fourth embodiments of the present invention, the support may be easily deformed due to a pressure applied to the support during a process of tightening the fastening nuts to both ends of the compressible bush. The above-mentioned problem is caused by a provision of weak portions on the support when the support is folded or cut to form the locking grooves. However, because only the locking holes 97 are formed on the support 95 according to the ninth embodiment of the present invention, it is possible to minimize the deformation of the support 95, regardless of the external force applied to the support 95.

Industrial Applicability

As described above, the present invention provides a shell unit of a compression-coupling device for iron bars, which stably maintains an assembled state of a plurality of shell pieces with a support by fixing the shell pieces on the support or by engaging the connection ribs of the shell pieces with the support, thus allowing a user to easily and quickly assemble the compression-coupling device during an iron bar-coupling process. The shell unit of the present

invention thus improves productivity and reduces the production costs of the compression-coupling devices for the iron bars, and, furthermore, reduces time to couple the iron bars to each other using the compression-coupling devices.

Claims

1. A shell unit of a compression-coupling device for iron bars, which is installed in a compressible bush that is tightened with two fastening nuts at both ends of the bush to compress the shell unit, and comprises at least two shell pieces each of which comprises two shell parts having a same shape, the two shell parts being placed at both ends of each of the shell pieces and connected together into a single structure by a connection rib, with a plurality of projections formed on inner surfaces of the shell pieces to grip the iron bars; and a support surrounded by the shell pieces at a position inside the connection ribs, thus supporting the shell pieces at predetermined positions in the compression-coupling device, the shell unit further comprising:

means for locking the connection ribs of the shell pieces to the support, the locking means comprising a plurality of locking grooves formed around an outer surface of the support at regular intervals to allow the connection ribs to be locked to the support by being fitted into the locking grooves.

2. The shell unit according to claim 1, wherein the support has a ring-shaped stop flange formed around an inner surface of the support to limit depths to which the iron bars are respectively inserted into the support from both ends of the support.

3. The shell unit according to claim 1, wherein the support is produced by bending a strip-shaped sheet into a rounded shape while folding the strip-shaped sheet to form the plurality of locking grooves around the outer surface of the support at the regular intervals.

4. The shell unit according to claim 1, wherein the support is produced by bending a strip-shaped sheet into a circular shape, and circumferentially cutting parts of the support to form a plurality of partial cut parts defined by cut

lines arranged along each of both edges of the support, and pressing the partial cut parts toward a center of the support to form the locking grooves; and each of the connection ribs comprises two connection rib pieces that are respectively integrated with two separate shell parts and are locked at ends thereof to the locking grooves of the support.

5. The shell unit according to claim 3 or 4, wherein the support is circumferentially cut at parts thereof to form a plurality of partial cut central parts which are arranged along a central line of the support and are each defined between two cut lines, the partial cut central parts are each cut at a center thereof into two pieces, and the two pieces of each of the partial cut central parts are bent toward a center of the support, thus forming a plurality of stop pieces to limit depths to which the iron bars are respectively inserted into the support from both ends of the support.

6. A shell unit of a compression-coupling device for iron bars, which is installed in a compressible bush that is tightened with two fastening nuts at both ends of the bush to compress the shell unit, and comprises at least two shell pieces each of which comprises two shell parts having a same shape, the two shell parts being placed at both ends of each of the shell pieces and connected together into a single structure by a connection rib, with a plurality of projections formed on inner surfaces of the shell pieces to grip the iron bars; and a support surrounded by the shell pieces at a position inside the connection ribs, thus supporting the shell pieces at predetermined positions in the compression-coupling device, the shell unit further comprising:

means for locking the connection ribs of the shell pieces to the support, the locking means comprising a locking groove formed on an inner surface of each of the shell parts of each of the shell pieces, and a plurality of supports respectively engaging with the locking grooves of the shell pieces.

7. A shell unit of a compression-coupling device for iron bars, which is installed in a compressible bush that is tightened with two fastening nuts at both ends of the bush to compress the shell unit, and comprises at least two shell pieces each of which comprises two shell parts having a same shape, the two shell parts being placed at both ends of each of the shell pieces and connected together into a single structure by a connection rib, with a plurality of projections formed on inner surfaces of the shell pieces to grip the iron bars; and a support surrounded by the shell pieces at a position inside the connection ribs, thus supporting the shell pieces at predetermined positions in the compression-coupling device, the shell unit further comprising:

means for locking the connection ribs of the shell pieces to the support, the locking means comprising a locking groove which is formed on an inner surface of each of the connection ribs between the shell parts of the shell pieces by bending a central portion of each of the connection ribs upward, so as to engage with the support.

8. A shell unit of a compression-coupling device for iron bars, which is installed in a compressible bush that is tightened with two fastening nuts at both ends of the bush to compress the shell unit, and comprises at least two shell pieces each of which comprises two shell parts having a same shape, the two shell parts being placed at both ends of each of the shell pieces and connected together into a single structure by a connection rib, with a plurality of projections formed on inner surfaces of the shell pieces to grip the iron bars; and a support surrounded by the shell pieces at a position inside the connection ribs, thus supporting the shell pieces at predetermined positions in the compression-coupling device, the shell unit further comprising:

means for locking the connection ribs of the shell pieces to the support, the locking means comprising a plurality of locking holes which are formed around the support at regular intervals; and a plurality of locking pins which are formed on the connection ribs between the shell parts of the shell pieces to be

inserted into the locking holes of the support, respectively.

FIG.1

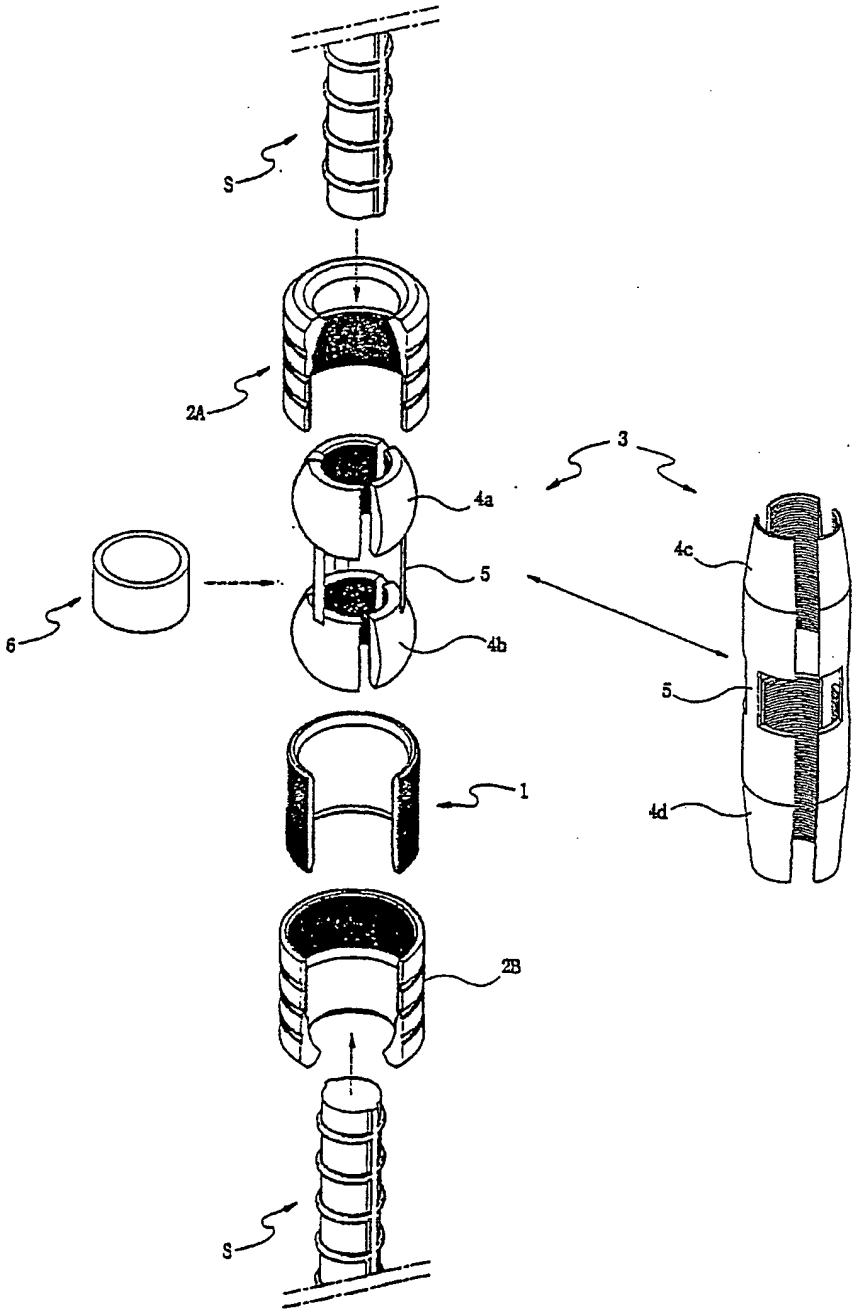


FIG.2

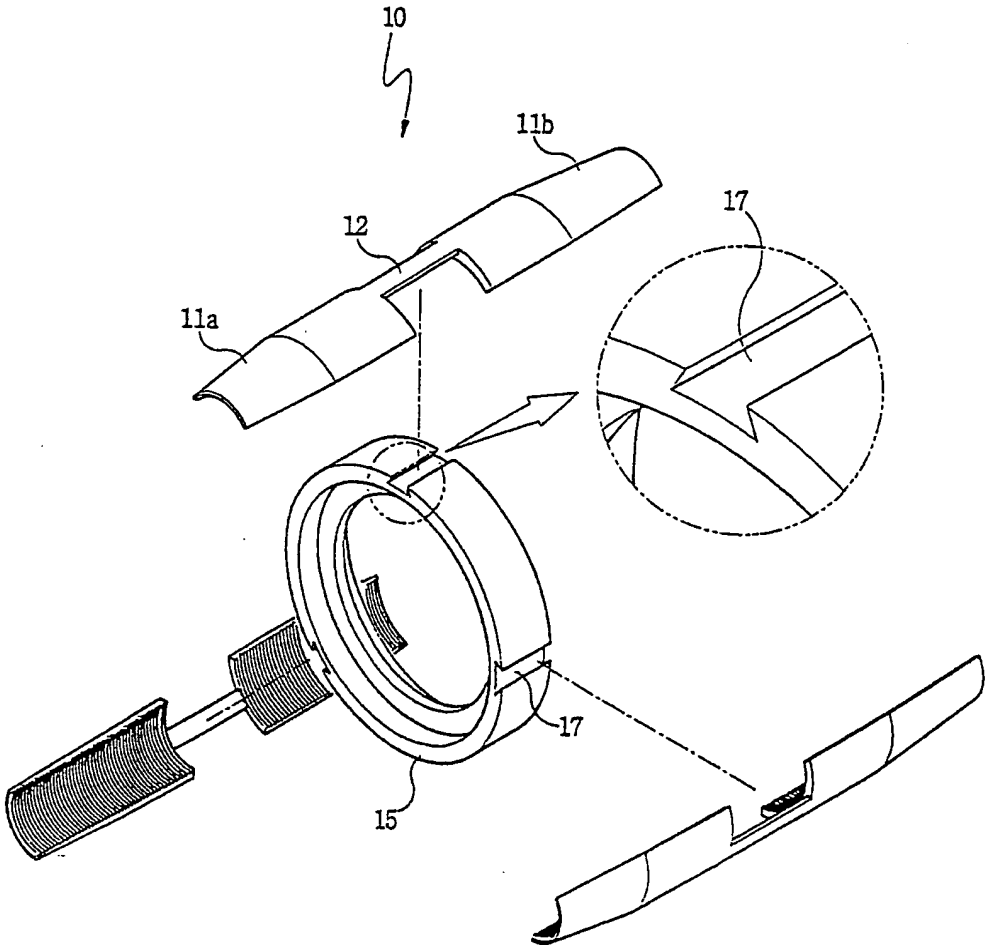


FIG.3

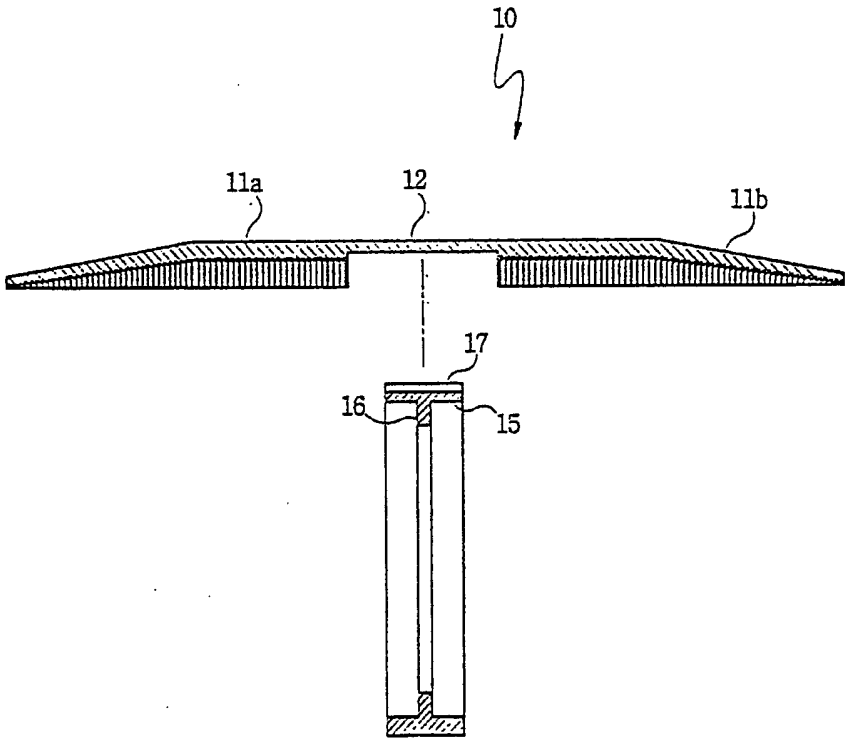


FIG.4

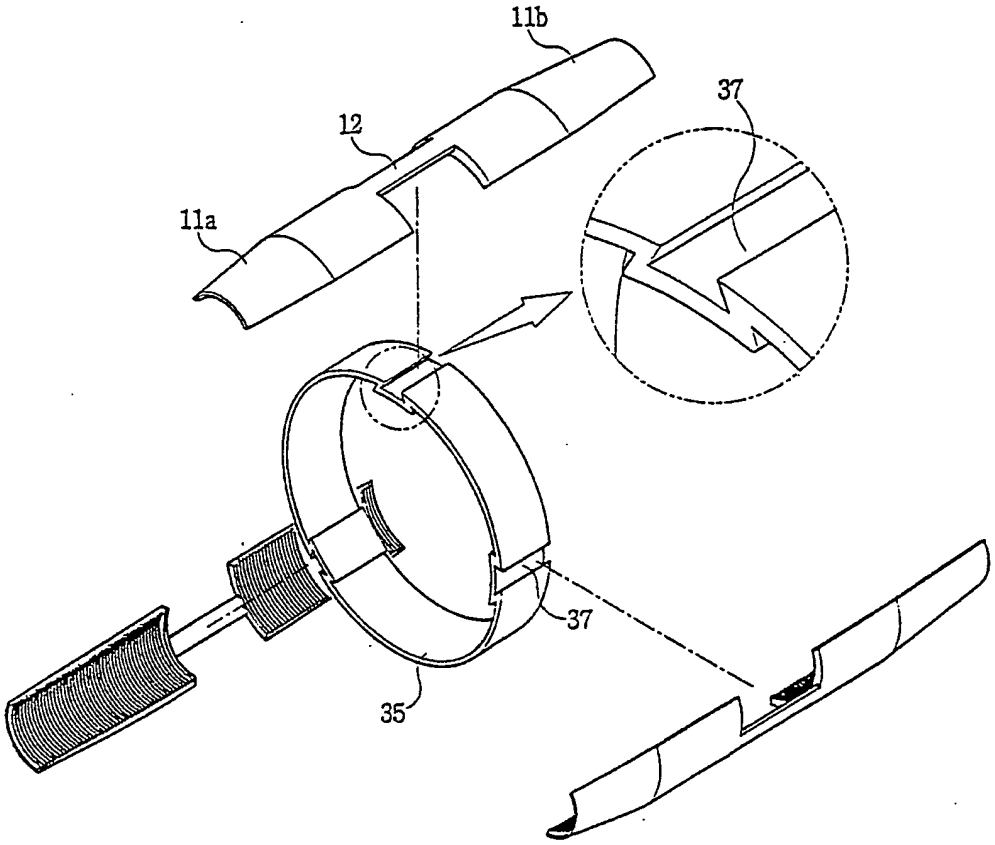


FIG.5

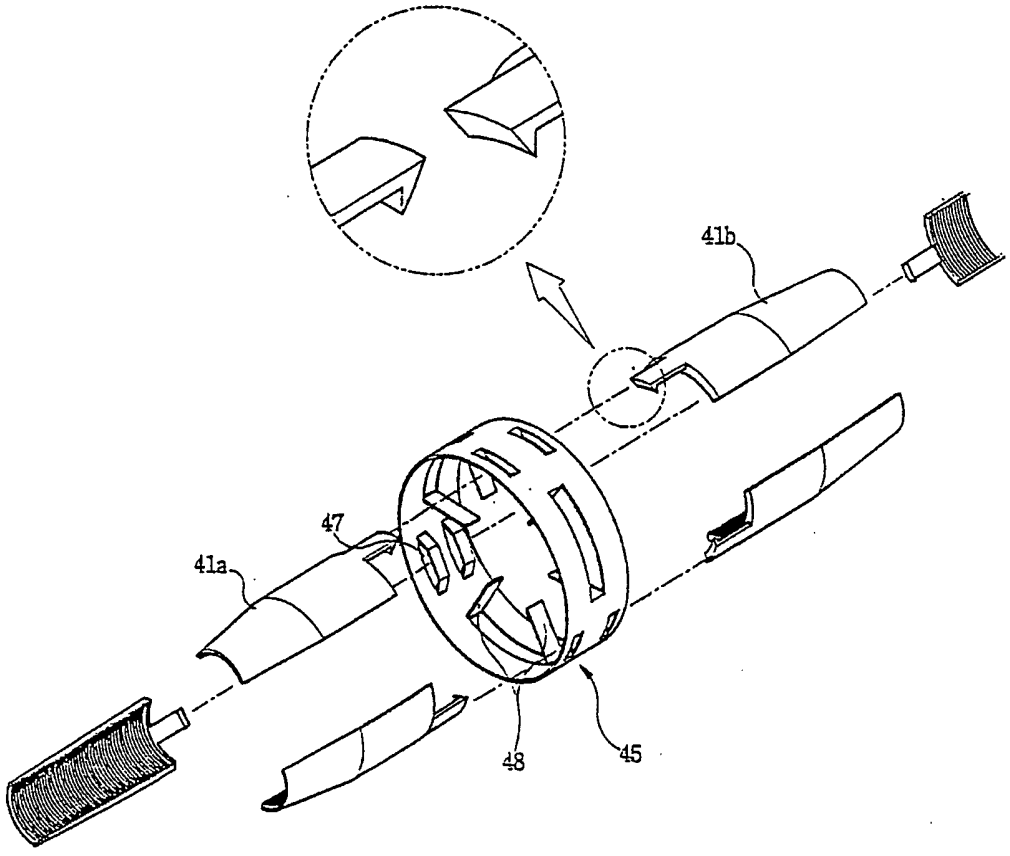


FIG.6a

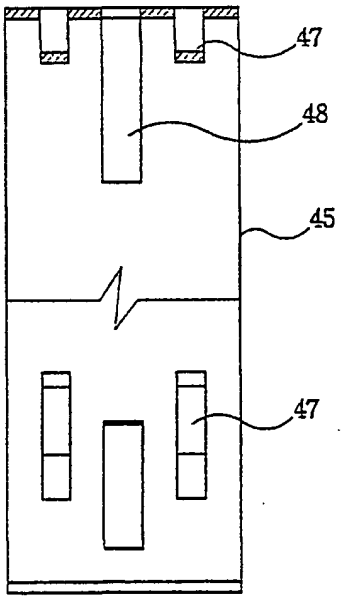


FIG.6b

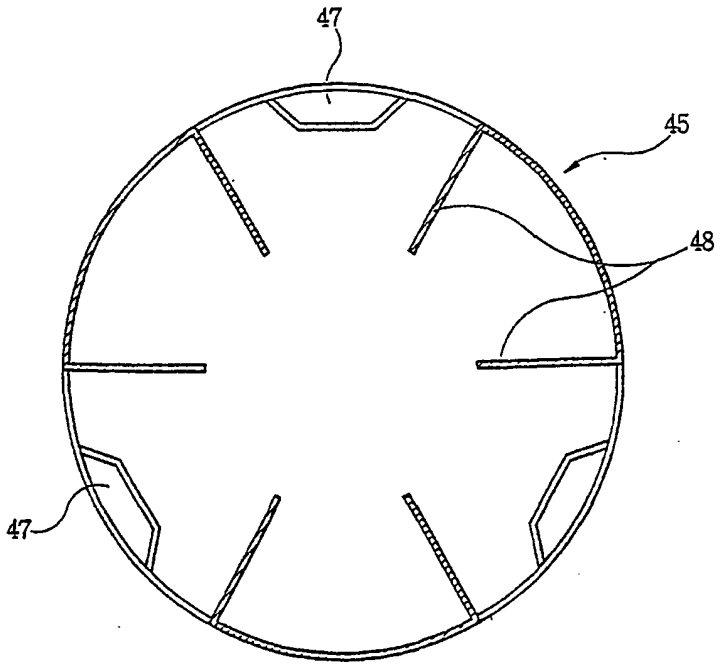


FIG.7

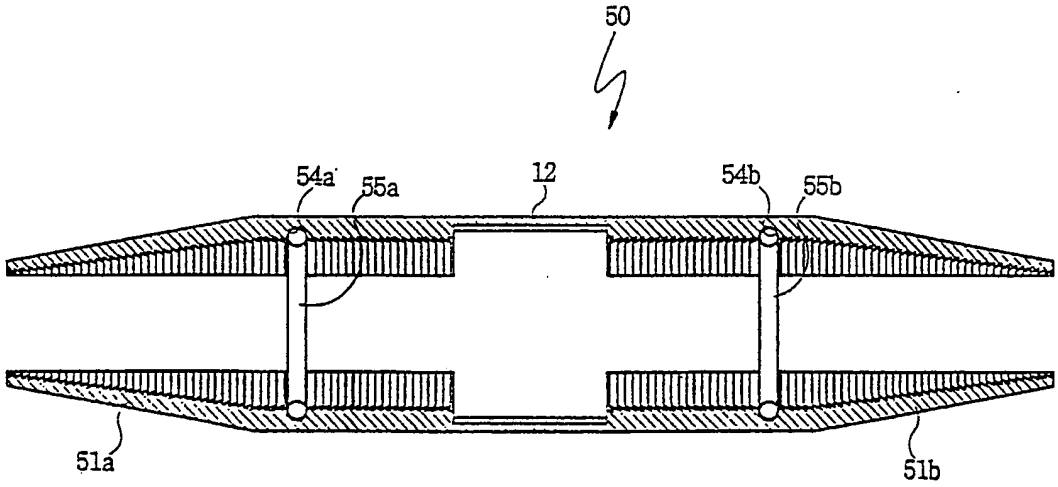


FIG.8

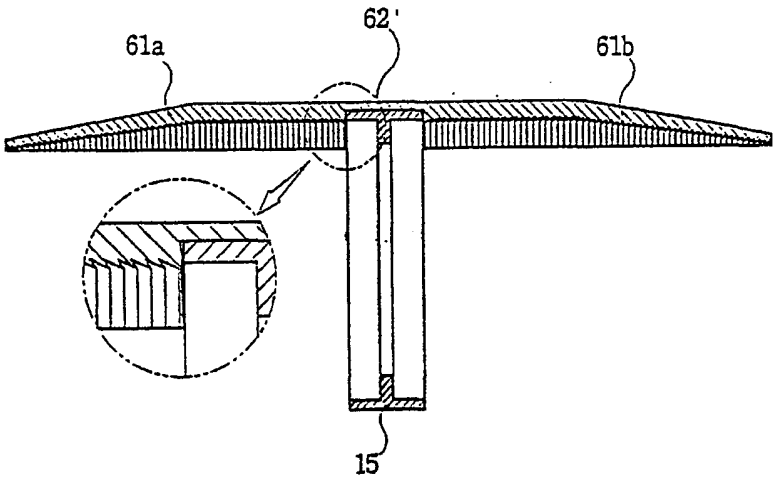


FIG.9

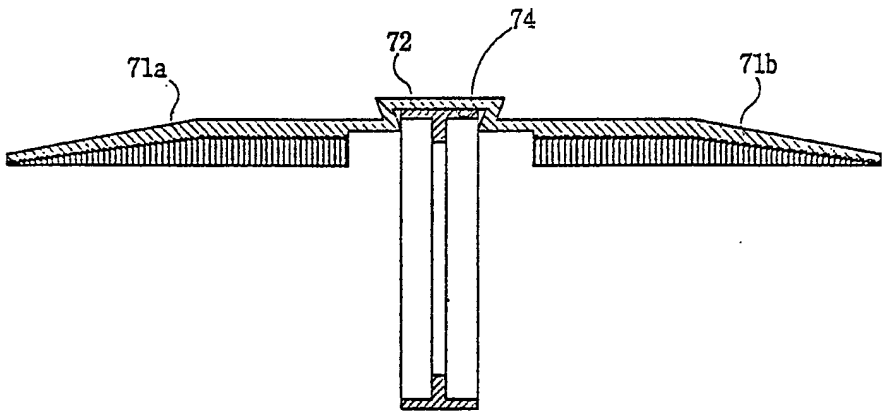


FIG.10

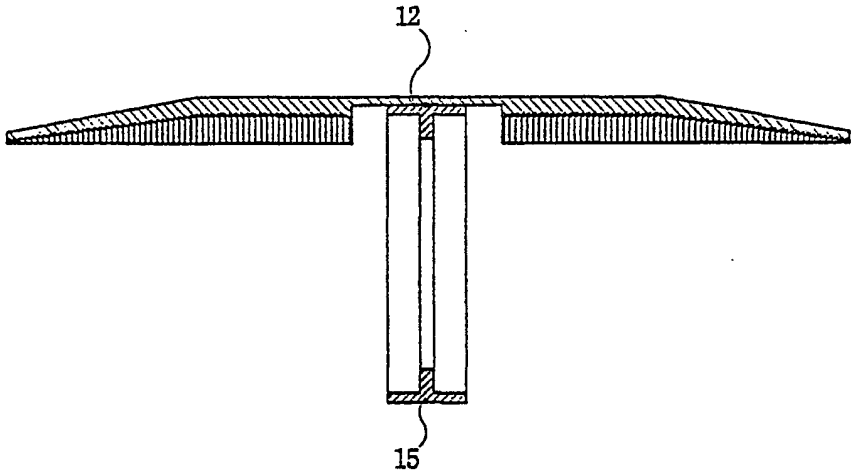


FIG.11

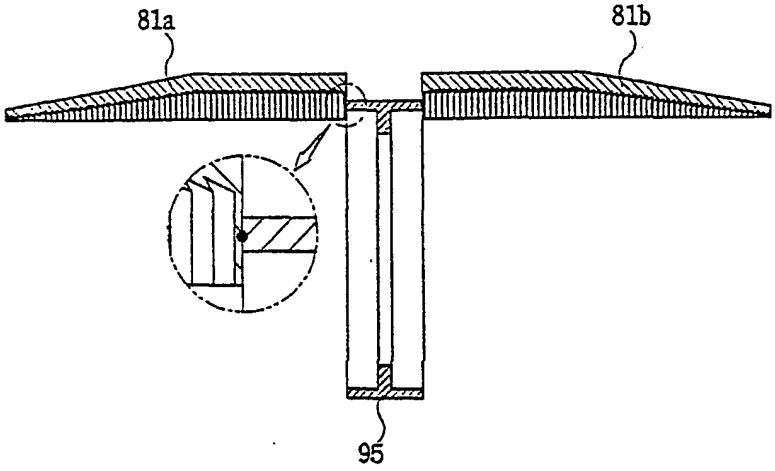
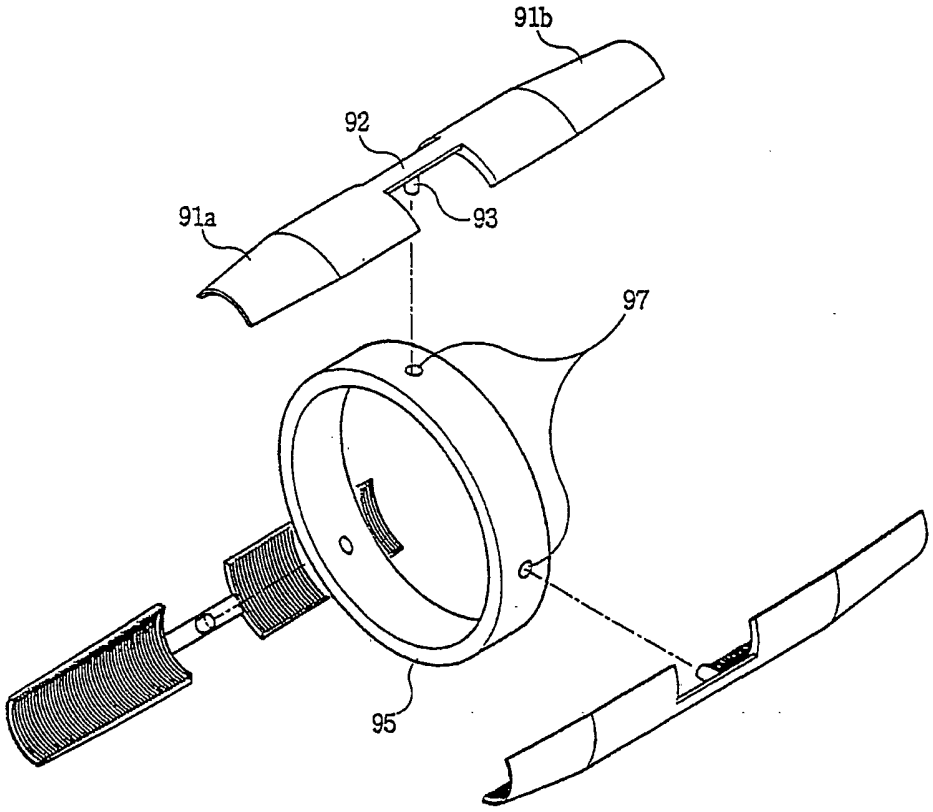


FIG.12



INTERNATIONAL SEARCH REPORT

International application No.
PCT/KR03/01751

A. CLASSIFICATION OF SUBJECT MATTER

IPC7 E04C 5/16

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC7 E04C 5/16, 5/18

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

KR, JP : classes as above

Electronic data base consulted during the intertnational search (name of data base and, where practicable, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	KR 286101 Y (WIN WIN DEVELOPMENT CO.,LTD.) 05 AUGUST 2002	1 - 8
A	KR 1998-68529 U (JEONG, KYUI CHO) 05 DECEMBER 1998	1 - 8
A	JP 48-73428 U (SASAKKI RYUJI) 13 SEPTEMBER 1973	1 - 8
A	JP 03-4832 U (DAIICHISEIKO CO.,LTD.) 18 JANUARY 1991	1 - 8
A	JP 07-82841 A (TOKYOTEKKO CO.,LTD.) 28 MARCH 1995	1 - 8

☐ Further documents are listed in the continuation of Box C.

☐ See patent family annex.

* Special categories of cited documents:
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"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
04 DECEMBER 2003 (04.12.2003)	08 DECEMBER 2003 (08.12.2003)

Name and mailing address of the ISA/KR
Korean Intellectual Property Office
920 Dunsan-dong, Seo-gu, Daejeon 302-701,
Republic of Korea
Facsimile No. 82-42-472-7140

Authorized officer
JANG, Hyung Il
Telephone No. 82-42-481-5798